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## **Applied behaviour analysis: What do teachers of students with autism spectrum disorder know**

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## **Applied behaviour analysis: What do teachers of students with autism spectrum disorder know**

### **Abstract**

With rising numbers of school-aged children with autism educated in mainstream classrooms and applied behaviour analysis (ABA) considered the basis of best practice, teachers' knowledge in this field has become a key concern for inclusion. Self-reported knowledge of ABA of special needs teachers (n=165) was measured and compared to their actual knowledge of ABA demonstrated in accurate responses to a multiple-choice test. Findings reported here show that teachers' self-perceived knowledge exceeded actual knowledge and that actual knowledge of ABA was not related to training received by government agency. Implications for teacher training are discussed.

### **Introduction**

Prevalence rates for autism spectrum disorder (ASD) have risen sharply over recent decades (Fombonne, 2003; Matson & Kozlowski, 2011; Wing, 1993). Several contributing factors have been identified including increased public awareness of characteristics of ASD and greater numbers participating in screening/diagnostic procedures (Fombonne, 2005). There is considerable concern about how an already overstretched education, care, and health system can cope (Sharpe & Baker, 2011). Presently, estimated prevalence rates for autism in the school population are 2% (CDC, 2015; DHSSPS, 2014) but this is likely an underestimation given that in the UK-wide Millennium Cohort Study (n=18,000+) parents of 3.5% of 11 year-olds were told that their child has autism (Dillenburger, Jordan, McKerr, & Keenan, 2015) and, 2.7% of 11 year-olds and 3.1% of 16 year-olds self-disclosed that they had autism (Dillenburger, Schubolz, McKerr, & Jordan, 2015).

There is a clear need for teachers in mainstream classes, as well as special education, to have expertise in ASD and evidence-based educational interventions (Alexander, Ayres, & Smith, 2015; Koegel, Matos-Freden, Lang, & Koegel, 2012; Morrier, Hess, & Heflin, 2011). Given that initial teacher training

entails very little input about autism (Dillenburger et al., 2014), much rides on the quality and content of continuous professional development (CPD; Jones, 2002; Odom, Collet-Klingenberg, Rogers, & Hatton, 2010; Parsons et al., 2009; Special Education Support Service, 2014b) .

Speck and Knipe (2005) provide a guide to essential elements for high quality professional development that would serve as a good guide in an effort to evaluate and reform teacher CPD.

A high quality program of CPD for teachers must:

- be focused on improving student learning,
- assess the participants learning needs and set goals accordingly,
- promote professional growth through sustained, intense training activities over a multi-year period,
- evaluate progress by collecting and analyzing data that informs program changes.

(Speck & Knipe, 2005 pp. 8-17)

In planning and implementing professional development activities, Borko (2004) recommends that organizers engage in more complex analysis of outcomes including: teacher knowledge, change to teacher practice, change to teacher thinking, and affect on student learning. This ideal is contrary to the typical one-shot workshop approach currently employed in most US (Darling-Hammond, 2005) and Irish (Banks & Smyth, 2011) schools. While the ultimate goal of professional development for teachers is the improved learning outcomes for their students, evidence based on data gathered throughout the process will help deliver these outcomes (Speck & Knipe, 2005).

High quality professional development is required to achieve real improved student learning. Avoiding a one size fits all approach to CPD by offering teachers choice and multiple levels of training is imperative to affect change with teachers based on their individual needs (Speck & Knipe, 2005). Intensity (i.e. providing multiple opportunities and methods sustained over time) and content that is focused on the everyday practice and specific subject matter of participants are key elements in this

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high quality approach (Borko, 2004; Kleiman, 2004; Speck & Knipe, 2005). Speck and Knipe (2005) expand on this element by suggesting the inclusion of new research and outside experts as a means of helping teachers evaluate their own practice and adapt new strategies to their own setting and teaching style.

Research regarding continuous professional development for teachers in Ireland is scant. Many of the studies that do exist focus on satisfaction ratings of participants (Glenn et al., 2012; PriceWaterhouseCooper, 2012) rather than learner outcomes as considered best practice (Speck & Knipe, 2005; Cochran-Smith, 2005). For example, Banks and Smyth (2011) compiled survey data on the uptake of CPD by teachers and the motivational factors that relate to individual participation. Professional development courses provided by the DES support services receive low levels of scrutiny (Teaching Council, 2011) in contrast to those opportunities offered by third level institutions, such as post-graduate diplomas, higher diplomas, and master of education degree programs that undergo rigorous internal validation and external accreditation processes much the same as ITE programs (Egan, 2004).

Multiple reports on CPD in Ireland have stress the need to base these training activities on evidenced-based practice (PriceWaterhouseCooper, 2012; Teaching Council, 2011) yet there continues to be a heavy reliance on simple qualitative post-hoc evaluations from participants of CPD for teachers, often related to organizational rather than content issues (Egan, 2004). Teacher-participants attending CPD courses are asked to complete a voluntary feedback form requesting information limited to their perceptions of the organization, venue, speaker, or training activities and the likelihood of the course changing their teaching methods and potential student achievement (PriceWaterhouseCooper, 2012). The authors of this report acknowledged the lack of data available on change in student outcomes or teacher use of new skill/ knowledge in their school as a result of CPD activity necessitated their use of teacher perception findings throughout this survey.

The nature of CPD provision in Ireland, and by the SESS specifically, can be enhanced to account for participant learning needs and individual goals (PriceWaterhouseCooper, 2012). Respondents indicated in this survey that some

needs, namely those of experienced teachers, were not being met by one-off introductory level seminars. Sustained intense programs of CPD can help teachers improve skills, increase knowledge base while directly affecting student learning outcomes through a multi-year process (Speck & Knipe, 2005). Local professional development communities can help create the sustained learning opportunities to bring about these goals (Borko, 2004).

While UK and Irish governments support an eclectic approach to education and health care interventions for children with ASD (National Institute for Health and Clinical Excellence (NICE), 2013), and the resultant extensive training requirements to promote mastery of multiple methodologies, the US governments endorse evidence-based practices (EBP) grounded in applied behaviour analysis (ABA; National Standards Project, 2015) .

### **Applied Behaviour Analysis**

The science of behaviour analysis has been applied successfully in a large variety of fields (e.g. health behaviours, behavioural safety, classroom management, organizational management to name but a few) and across all age-ranges and therefore is considered the basis for evidence-based autism interventions (United States Congress, 1997; US Surgeon General, 1999). ABA-based therapy is widely endorsed by law, for example, the Individuals with Disabilities Education Act of 1997 (IDEA, 1997) requires that

[i]n the case of a child whose behavior impedes his or her learning or that of others, [professionals] consider, when appropriate, strategies, including positive behavioral interventions, strategies, and supports [based on ABA] to address that behaviour (Sect.614 (d)(3)(B)(i)).

US legislation requires the completion of a functional behavioural assessment (FBA) and implementation of a behavioural intervention plan based on FBA for students with special educational needs and challenging behaviours (IDEA: United States Congress, 1997; No Child Left Behind: United States Congress, 2001). Similarly in the UK, NICE (2015) requires professionals to carry out

functional behavioural assessments, particularly in cases where behaviours are considered challenging.

ABA has a well-documented history and there are literally thousands of studies evidencing effectiveness in a large range of areas (e.g. Journal of Applied Behavior Analysis; (Dixon, Vogel, & Tarbox, 2012; Eldevik et al., 2009; Makrygianni & Reed, 2010; Rivard, Terroux, & Mercier, 2014; Schlinger & Normand, 2013; Virués-Ortega, 2010) .

### **ABA-based interventions for people with autism**

Applied behaviour analysis (Baer, Wolf, & Risley, 1968) has long been utilized to help individuals with autism spectrum disorder increase socially relevant skills and thus improve quality of life for this population and their families (Ferster & DeMyer, 1961) .

As a basis for educational interventions for students with ASD, ABA has accumulated a considerable amount of empirical support (Dawson et al., 2010; Eikeseth, Smith, Jahr, & Eldevik, 2007; Lovaas, 1987) . In fact, ABA-based early intensive interventions are statistically significantly related to optimal outcomes for children with ASD (Fein et al., 2013; Kelley, Naigles, & Fein, 2010; Orinstein et al., 2014) .

Despite this large body of supporting evidence, ABA-based interventions are not available universally (Dillenburger, Keenan, Doherty, Byrne, & Gallagher, 2012) . Lack of ABA-based interventions has a negative effect on service cost, family stress levels, quality of available services, and long-term outcomes (Buescher, Cidav, Knapp, & Mandell, 2014; Howlin, Savage, Moss, Tempier, & Rutter, 2014) .

Instead, a rather ill-defined 'eclectic approach' (Dillenburger, 2011) has been promoted in Ireland (Parsons et al., 2009; The Task Force on Autism, 2001) and the UK, e.g.: Northern Ireland (Department of Education Northern Ireland (DENI), 2002), Scotland (Dunlop et al., 2009), and England (Cumine, Leach, & Stevenson, 2000; Powell & Jordan, 1997) .

The lack of clear definition and coherent concept underpinning the eclectic approach is evidenced in (Jordan, Jones, & Murray, 1998) , who argued that in the eclectic approach 'All interventions have several aspects or parts, some of which may be very different from one another'. (P.5)

This vague characterization is not only precarious for practitioners and researchers it also provides major obstacles when considering training programmes. In fact, comprehensive staff training in the eclectic approach, i.e., mastery of multiple theories and therapy methodologies to acceptable levels of competence and programme fidelity, is virtually impossible (Dillenburg, 2011). Thus, individual interventions that may be included in an eclectic programme usually lack evidence of effectiveness and may even be detrimental (Lang et al., 2012; Scott, Liaupsin, Nelson, & McIntyre, 2005; Van Acker, Borenson, Gable, & Potterton, 2005) . There is no evidence that the synergetic effect is beneficial, in fact there is evidence to the contrary (Howard, Stanislaw, Green, Sparkman, & Cohen, 2014) .

Due to lack of internationally approved training in ABA (BACB, 2015) in the UK or Ireland, regrettably, UK and Irish governments and many professionals still caricature ABA as 'one method of intervention' (Dillenburg & Keenan, 2009; Leslie & Tierney, 2013) and may even recommend ABA to be used within the eclectic approach (Keenan, Dillenburg, Moderato, & Hanns-Rudiger, 2010; Special Education Support Service, 2013) . "Training in ABA' may be offered in short courses, commonly ranging from 1-2 hours in duration (Department of Education Northern Ireland (DENI), 2015; Dillenburg et al., 2014).

On the other hand, an extensive programme of professional development opportunities is available to Irish teachers through the Special Education Support Service (Special Education Support Service, 2014a) of the Department of Education and Skills (DES). Some of this training is reportedly about ABA. Although teachers are encouraged to attend these courses, participation is strictly voluntary.

In order to establish the knowledge-based in ABA in teachers in Ireland, a survey of Irish special education teachers was conducted to ascertain self-perceived vs. actual knowledge of ABA. Results were then compared in terms of training levels.

## **Methodology**

### **Participants**

One hundred and sixty-five ( $n=165$ ) teachers of students with ASD in Irish schools responded to the survey. The majority of respondents (60%) were between the ages of 30-49 years of age and many (44%) reported having more than 10 years experience of teaching in general. However, only a small number of participants had extensive experience teaching students with ASD; most of respondents (67.8%) had <5 years experience of working with this population (7.9% of the respondents did not indicate the duration of experience in this field).

### **Research tool**

An online survey (using *SurveyMonkey*®) was developed specifically for the purpose of the present research. The first section of the survey sought demographic information and information about the training and training provider, e.g., coded as (1) no training, (2) government supported training, and (3) other training. Respondents were then asked to self-declare their understanding of ABA and functional behavioural assessment (FBA) on a simple four-point rating scale (i.e. (1) very little, (2) somewhat, (3) good, and (4) very good).

The second section of the survey included eleven questions (i.e., three true/false questions, four multiple choice questions, two open-ended response questions, and one multiple answer question) to assess participants' actual knowledge of



ABA, including elements of FBA procedures. Question types were randomized throughout the survey.

The first survey item asked respondents to recognize various measurable dimensions of behaviour (i.e. frequency, duration, latency) by means of a true/false question. The second item was a multiple-choice question that asked participants to indicate the 'goal of an ABA intervention'. The response choices presented were: to eliminate targeted behaviours, to improve socially significant behaviours, or to reduce stress for carers/teachers (i.e., correct response: 'to improve socially significant behaviours').

The third survey item was a multiple answer question that had two correct responses from four items presented. Teachers were asked to choose as many stimuli as applicable that result in the 'increase the likelihood of a behaviour occurring in the future'. The options included: positive reinforcement, positive punishment, negative reinforcement, and negative punishment (i.e., two correct responses: 'positive reinforcement' and 'negative reinforcement').

In the fourth item participants were asked to provide an answer to the question: 'As a form of negative punishment, what is removed to affect a "timeout" procedure for a student's behaviour?' As an open-ended question, respondents were free to provide any answer they chose for this item (i.e., correct response: 'positive reinforcement', or approximations e.g. reinforce, reinforcement).

Fifth, given a procedural definition (i.e. 'when approximations of a target behaviour are reinforced') respondents were asked to identify the correct procedure from the options: shaping, extinction, and variable reinforcement (i.e., correct response: 'shaping'). A true/false question followed that asked participants to agree or disagree with the statement: Stimulus fading is when antecedent stimulus is changed while maintaining the target behaviour. (i.e., correct response: 'true'). Participant knowledge of functional behavioural assessment procedures was assessed by asking respondents to indicate which item was not considered part of the FBA process with a choice being: antecedent

variables, physical prompts, and consequent variables (i.e., correct response: 'physical prompts').

The penultimate survey item presented respondents with four statements of which only one was true. Participants were asked to indicate which one they deemed to be truthful. The statements were: (1) Punishment is ineffective at reducing target behaviour, (2) applied behaviour analysis is a behaviour change programme created especially for use with people with autism spectrum disorders, (3) negative reinforcement contingencies serve to increase a target behaviour, and (4) reinforcement must follow every occurrence of a targeted behaviour to have a reinforcing effect (i.e., correct response: 'negative reinforcement contingencies serve to increase a target behaviour'). The final item of the survey was a true/false question: An 'ABC' (antecedent-behaviour-consequence) chart is an example of a task analysis (i.e., correct response: 'false').

## **Procedures**

Participant recruitment used a three-pronged approach.

- (1) Participants were recruited directly during three professional development courses delivered by SESS for teachers of students with ASD and other special educational needs. Attendees (total approximately n=210) were offered online or paper copy access to the survey. A total of 88 survey responses were returned (response rate 44%), split equally between paper and online survey completion.
- (2) Emails containing researcher identification, purpose of the study, request for participation and a survey link were sent to general school email addresses from a publically available list of Irish mainstream schools that had special classes for students with ASD (NCSE: National Council for Special Education, 2013). Email addresses for these schools were obtained via school websites and [www.schooldays.ie](http://www.schooldays.ie). The schools were asked to forward the information to the relevant teachers of students with ASD.

(3) Emails containing researcher identification, purpose of the study, request for participation, and a survey link were sent to general school email addresses of special schools with ASD specific classes and 12 pilot schools (formerly known as ABA Models of Education). These lists were sourced from the NCSE (2013). The schools were requested to forward the information to the relevant teachers of students with ASD.

In total, 238 e-mails were sent to schools, including 141 primary schools, 57 secondary schools, 29 special schools, and 11 former ABA schools.

Approximately 15 emails were returned as undeliverable; a follow-up search was conducted for alternative email addresses, however, 11 emails remained undeliverable. Given that some of the schools may have forwarded the email to multiple eligible teachers, the exact number of individual potential participants could not be undetermined.

A total of n=165 responses were returned (response rate 72%, calculated on the basis of 238 sent emails).

### **Ethics**

The research was conducted in line with Queen's University Belfast Research Governance Procedures and approved by the School of Education Research Ethics Committee.

### **Results**

#### **Training provider**

Only 59 responses (35.8% of the total sample) included details of the training provider for ABA; of these, only n=5 reported having received no training in ABA, while 66.1% (n=39) of these respondents stated that they had received government supported training in the area of behaviour analysis.

#### **Self-declared level of understanding of ABA**

Twenty-six (15.8%) teachers reported self-perceived knowledge of ABA to be very good, while thirty-three of them (20.0%) rated their knowledge of ABA as

‘good’. Thus, a total of fifty-nine teachers (35.8%) thought that their knowledge of ABA was either good or very good.

Fifty teachers (30.3%) rated their understanding of ABA as ‘very little’, while a further thirty-three of them (20%) identified their knowledge of ABA as ‘somewhat’. Eighty-three (50.3%) teachers indicating that they had only minimal knowledge of the science of behaviour analysis. Twenty-three respondents (13.9%) failed to provide the self-report of knowledge of ABA. The majority of teachers who reporting a ‘very good/good’ knowledge of ABA also indicate having participated in CPD from the government provider. On the basis of this self-report, respondents were grouped as having knowledge of ABA on two levels, either ‘good/very good’ (n=59) or ‘little/minimal’ (n=83).

#### **ABA knowledge assessment**

Table 1 shows the responses to the knowledge questions posed to participants on the topic of applied behaviour analysis, including functional behavioural assessment.

The highest rate of correct responses for both groups was reported for the first item surveyed. While this question was about a basic attribute of behaviour, the relatively high rate of correct repsonding may be due to the fact that this question was presented as a true/false survey item. There was a 50:50 probability of a correct response by chance, in fact the group reporting less knowledge of ABA gained a higher rate of correct responses, i.e., 10% higher than those who self-reported more knowledge of ABA.

The group purporting to have a greater knowledge of ABA also had a poorer performance in the second item, regarding the goal of an ABA-based intervention. Furthermore, despite self-reporting a ‘good’ understanding of ABA less than four in ten (38.9%) of these teachers responded correctly that the goal of ABA interventions was to improve socially significant behaviours. Their performance on this item was in fact surpassed by those acknowledging ‘little’

understanding of ABA with more than half (50.6%) of the group selecting the correct response.

The answer selected by many of the other participants was that the goal of ABA interventions is to 'eliminate target behaviours'. These results seem to suggest that teachers categorize ABA as a system for intervention in challenging behaviour reduction or elimination rather than the technology to teach new skills and behaviours that it is (Mitchell, 2008).

The next item in the survey required a more complex understanding of behavioural principles. This was the only example of a multiple answer test question. Respondents were asked what was 'likely to increase behaviour in the future'. Equal numbers in each of the groups correctly identified 'positive reinforcement' as a means of increasing future behaviour (61% and 60% for those with 'good' knowledge and those with 'little knowledge, respectively).

However, correct identification of 'negative reinforcement' as related to increasing future behaviour was nearly half that of 'positive reinforcement'. In fact, more respondents in the 'little knowledge' group (n=30; 36%) selected this correct response, with only 19 (32%) of the 'good knowledge' group getting this right.

These responses are perhaps not surprising since misuse of the terminology 'positive reinforcement' and 'negative reinforcement' is common. The general public frequently equates 'negative reinforcement' with punishment (i.e. the application of an aversive to reduce or eliminate an unwanted behaviour). While this mistake is common, greater understanding would be expected of educational professionals, especially those who have received state funded training and who claim to have a good or very good knowledge of ABA.

The next item asked respondents to supply the missing element in the definition of 'time-out' through the use of an open-ended response format. Only 5.1% (n=3) of the teachers reporting 'good' knowledge of ABA answered correctly. None of

the respondents who reported having 'little' knowledge of ABA answered correctly. A large number of non-responses came from both groups; n=29 (49%) for those who claimed to have good knowledge, vs. n=49 (59%) of those who reported poor knowledge of ABA.

Low completion rates on this item may have been the result of the question format (i.e. greater response effort). However, time-out procedures are often used within school discipline procedures (Maag, 2001; Yang, 2009) and thus qualified teachers would be expected to be familiar with the basic procedure.

The next open-response question was a statement (i.e., 'A behaviour which occurs across different settings, with different people, and over an extended time is said to have been...'). Only nine (15.3%) respondents identified as having 'good' knowledge of ABA correctly wrote 'generalization' (or equivalent words) and those who had declared 'little' knowledge of ABA fared even worse with only two correct responses were recorded (2.4%).

## **Discussion**

The current research reported the results of a survey of teachers of students with ASD to assess their knowledge of applied behaviour analysis. Participants (n=165) were asked to indicate their self-perceived knowledge of ABA principles (response rate 86%; n=142). Respondents were placed into groups of those with 'very good/good' ABA knowledge (n=59) and those with 'somewhat/little' ABA knowledge (n=83). They were asked to respond to a multiple choice test assessing their actual knowledge of ABA. Test items required participants to define or provide examples of very basic elements of the science of behaviour.

The performance of teachers who participated in this study indicated that there was very little real understanding of ABA principles across both groups. The group of teachers claiming to have 'very good/good' knowledge of behavioral principles fared worse than those purporting to have little ABA knowledge, in

most of the basic test items. The teachers who self-declared to have 'very good/good' knowledge of ABA outperformed those who thought that their knowledge was limited on only 4/11 test items, despite the fact that the content of the multiple choice test were quite basic and they had received Government funded training.

Teachers who thought that they had 'somewhat/little' knowledge of ABA outscored their counterparts on one of these items by more than 10% correct responses, despite the fact that they had received no training or non-Government funded training. The majority of both groups failed to respond to the two items that were more difficult as they were utilizing the open-ended response format.

The current study was the first time empirical evidence was gathered on the ABA knowledge of Irish teachers of students with ASD and the effectiveness of Government training programmes. To-date, only participant satisfaction data has been collected for the efficaciousness of publicly funded continuous professional development (Price, Waterhouse, and Coopers LLB, 2012). CPD providers for educators in Ireland only collect limited feedback from participants and no participant database has been established to date (Banks & Smyth, 2011; O'Gorman & Drudy, 2010; Price, Waterhouse, and Coopers LLB, 2012) .

Improving student outcomes has been directly related to improved, efficacious professional development and initial teacher education (Darling-Hammond, 2010; Speck & Knipe, 2005) . In order to make evidence-based decisions about effective CPD models and training providers, data would be needed that goes beyond the basic qualitative post-training feedback that is gathered currently.

The present survey offers a representative sample (n=165) out of a total of 320 registered special needs teachers in Ireland (National Council for Special Education, 2013; Special Education Support Service, 2013). There is no central database of CPD participation nor is there any research regarding the affect of CPD participation on learner outcomes or classroom practice (Price,

Waterhouse, and Coopers LLB, 2012) in the Irish Department of Education and Skills. Therefore this survey relied on teacher self-reports regarding knowledge level of the content areas and participation in CPD and the training provider.

Price, Waterhouse, and Coopers (2012) report an interesting response by a segment of a focus group when asked about CPD in the absence of the SESS program of training. Many respondents suggest they would have participated in third level SEN postgraduate programs as a means of professional development had the SESS training not been available. The college of education postgraduate courses, however, have an advantage over the CPD training offered by the SESS in that the former are accredited by the Teaching Council (Egan, 2004) and the latter are not accredited at all. Egan (2004) concluded that an increase in teacher uptake of postgraduate programs through third level institutions, often at the teacher's own expense, is evidence of the support for accredited CPD for teachers in Ireland. As a guide to future policy regarding teacher CPD, the Teaching Council has proposed that CPD completion become part of the renewal of licensure process and that CPD courses undertaken should be counted towards additional qualification for participants (Teaching Council, 2011). Increasing the level of teacher undertaking postgraduate programs of study should be incentivized as a means of growing the indigenous expertise in critical areas of needs (e.g. ASD education, inclusive practice, and applied behavior analysis).

## **Conclusion**

Further investigation of the efficacy of training teachers in ABA is necessary, e.g., in a cost-savings analysis of the government service delivery model of CPD. Students with ASD in Irish schools require teachers with expertise in evidence-based practice in order to maximize their potential. Research should include tests of CPD participant knowledge prior to and following training programme completion (e.g., McKee & Dillenburger, 2012). These assessments need to be more extensive than the survey used in this study and may benefit from a graded array of test items (e.g. basic, intermediate, and expert level knowledge probes). Furthermore, university based training to international standards in ABA should be made available to teachers (Behavior Analysts Certification Board, 2015).



BACB qualifications provide a measure of consumer protection and a means of displaying professional competence (Dorsey, Weinburg, & Guidi, 2009) . Acceptance of these credentials by government agencies in Ireland is necessary to ensure that ABA methods are not being implemented by individuals without credentials and by teachers in Irish schools with insufficient training to design and deliver efficacious interventions (Keenan et al., 2010). This kind of training would ensure that children and adults with autism in Ireland receive optimal interventions and skills development that can improve their quality of life and reduce the need for state funded care and support throughout their lives (Sharpe & Baker, 2011) .

Until such times, ABA will continue to be employed on the island of Ireland (Dillenburger et al., 2012; Leslie & Tierney, 2013) without quality control or adequate teacher training (Keenan et al., 2010).

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**Table 1:** Self-perceived knowledge of ABA compared with actual knowledge

	Correct		Incorrect		No response	
	*Self +	**Self -	*Self +	**Self -	*Self +	**Self -
1. Dimensions of behaviour	71.1% (n=42)	81.9% (n=68)	0 (n=0)	3.6 (n=3)	28.9% (n=17)	14.5% (n=12)
2. Goals of ABA	38.9% (n=23)	50.6% (n=42)	32.2% (n=19)	27.7% (n=23)	28.9% (n=17)	21.7% (n=18)
3. Positive Reinf. defined	61.0% (n=36)	60.2% (n=50)	11.9% (n=7)	25.4% (n=21)	27.1% (n=16)	14.4% (n=12)
3. Negative Reinf. defined	32.2% (n=19)	36.1% (n=30)	40.7% (n=24)	49.6% (n=41)	27.1% (n=16)	14.4% (n=12)
4. Time out procedure	5.1% (n=3)	0.0% (n=0)	45.8% (n=27)	41.0% (n=34)	49.19% (n=29)	59.0% (n=49)
5. Identify shaping procedure	62.7% (n=37)	38.6% (n=32)	10.2% (n=6)	26.5% (n=22)	27.1% (n=16)	34.9% (n=29)
6. Identify stimulus fading	61.0% (n=36)	55.4% (n=46)	3.4% (n=2)	10.9% (n=9)	35.6% (n=21)	33.7% (n=28)
7. Skill generalization defined	15.3% (n=9)	2.4% (n=2)	28.8% (n=17)	34.9% (n=29)	55.9% (n=33)	62.7% (n=52)
8. Elements of an FBA	45.8% (n=27)	24.1% (n=20)	18.6% (n=11)	34.9% (n=29)	35.6% (n=21)	41.0% (n=24)
9. Identify effect of neg. reinforcement	10.2% (n=6)	8.4% (n=7)	49.1% (n=29)	59.1% (n=49)	40.7% (n=24)	32.5% (n=27)
10. ABC data collection tool	39.0 (n=23)	22.9% (n=19)	28.8% (n=17)	45.8% (n=38)	32.2% (n=19)	31.3% (n=26)

\*good/very good self-perceived knowledge

\*\*little/minimal self-perceived knowledge

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